

nerves have been shown by the experiments of Bischoff to be among the worst possible conductors of this agent, the author contends that the nervous energy can be neither electricity, nor galvanism, nor any property related to those powers; and conceives that the phenomena are best explained on the hypothesis of undulations or vibrations propagated along the course of the tubes which compose the nerves, by the medium of the oily globules they contain. He traces the operation of the various causes which produce sensation, in giving rise to these undulations; and extends the same explanation to the phenomena of voluntary motion, as consisting in undulations, commencing in the brain, as determined by the will, and propagated to the muscles. He corroborates his views by ascribing the effects of cold in diminishing or destroying both sensibility and the power of voluntary motion, particularly as exemplified in the hybernation of animals, to its mechanical operation of diminishing the fluidity, or producing solidity in the oily medium by which these powers are exercised.—*Proceedings of the Royal Society*, No. 56.

4. *On the special Function of the Skin.* By ROBERT WILLIS, M. D.—The purpose which is answered in the animal economy by the cutaneous exhalation has not hitherto been correctly assigned by physiologists. Dr. Willis believes it to be simply the elimination from the system of a certain quantity of pure water; and he considers that the saline and other ingredients which pass off at the same time by the skin, are in too inconsiderable a quantity to deserve being taken into account. He combats, by the following arguments, the prevailing opinion, that this function is specially designed to reduce or to regulate the animal temperature. It has been clearly shown, by the experiments of Delaroche and Berger, that the power which animals may possess of resisting the effects of a surrounding medium of high temperature, is far inferior to that which has been commonly ascribed to them; for, in chambers heated to 120° to 130° F., the temperature of animals is soon raised 11°, or even 16° above what it had been previously, and death speedily ensues. The rapid diminution, or even total suppression of the cutaneous exhalation, on the other hand, is by no means followed by a rise in the temperature of the body. In general dropsies, which are attended with a remarkable diminution of this secretion, an icy coldness usually pervades both the body and the limbs. A great fall in the animal temperature was found by Fourcauld, Becquerel and Breschet to be the effect of covering the body with a varnish impervious to perspiration; and so serious was the general disturbance of the functions in these circumstances, that death usually ensued in the course of three or four hours.

The question will next arise, how does it happen that health, and even life, can be so immediately dependent as we find them to be on the elimination of so small a quantity of water as thirty-three ounces from the general surface of the body in the course of twenty-four hours? To this the author answers, that such elimination is important as securing the conditions which are necessary for the endosmotic transference between the arteries and veins of the fluids which minister to nutrition and vital endowment. It is admitted by physiologists that the blood, whilst still contained within its conducting channels, is inert with reference to the body, no particle of which it can either nourish or vivify until that portion of it which has been denominated the *plasma* has transuded from the vessels, and arrived in immediate contact with the particle that is to be nourished and vivified: but no physiologist has yet pointed out the efficient cause of these tendencies of the plasma, first, to transude through the wall of its efferent vessels, and, secondly, to find its way back again into the afferent conduits. The explanation given by the author is that, in consequence of the outgoing current of blood circulating over the entire superficies of the body perpetually losing a quantity of water, by the action of the sudoriparous glands, the blood in the returning channels has thereby become more dense and inspissated, and is brought into the condition for absorbing, by endosmosis, the fluid perpetually exuding from the arteries, which are constantly kept on the stretch by the injecting force of the heart.

In an appendix to the paper, the author points out a few of the practical applications of which the above-mentioned theory is susceptible. Interference with the function of the skin, and principally through the agency of cold, he observes, is the admitted cause of the greater number of acute diseases to which mankind, in the temperate regions of the globe, are subject. He who is said to have suffered a chill, has, in fact, suffered a derangement or suppression of the secreting action of the skin, a process which is altogether indispensable to the continuance of life; and a disturbance of the general health follows as a necessary consequence. Animals exposed to the continued action of a hot, dry atmosphere, die from exhaustion; but when subjected to the effects of a moist atmosphere, of a temperature not higher than their own, they perish much more speedily, being destroyed by the same cause as those which die from covering the body with an impervious glaze; for, in both cases, the conditions required for the access of oxidized, and the removal of deoxidized plasma, are wanting, and life necessarily ceases. The atmosphere of unhealthy tropical climates differs but little from a vapour bath at a temperature of between 80° and 90° F.; and the dew point in these countries, as, for example, on the western coast of Africa, never ranges lower than 3 or 4 degrees, nay, is sometimes only a single degree below the temperature of the air. Placed in an atmosphere so nearly saturated with water, and of such a temperature, man is on the verge of conditions that are incompatible with his existence; conditions which may be easily induced by exposure to fatigue in a humid atmosphere, under a burning sun, or other causes which excite the skin, while they prevent the exercise of its natural function. The terms *miasma* and *malaria* may, according to the author, be regarded as almost synonymous with air at a temperature of from 75° to 85° F., and nearly saturated with moisture.—*Proceedings of the Royal Society*, No. 56.

5. *On the import and office of the Lymphatic Vessels.* By ROBERT WILLIS, M. D.—That absorption is the especial office of the lymphatic vessels was, until very lately, a universally received doctrine in physiology: but it is now admitted that if they exercise this faculty, it can be only to an inconsiderable extent; and physiologists of high authority have even denied that they possess any absorbing power at all. This last is the opinion of Magendie, in which Dr. Willis concurs. So lately as 1841, Rudolph Wagner asserted that “neither anatomical or physiological considerations render any satisfactory account of the import and office of the lymphatics,” which, thus shorn of their ancient office, were repudiated as a superfluous apparatus in the animal mechanism. The grand organs of absorption Dr. Willis believes to be the veins; and a principal object of this paper is to point out the mode in which they acquire this remarkable faculty. The principal condition which this faculty of imbibition implies, is a difference of density between the contents of the vessels which are to absorb, and the contents of those which furnish the matter to be absorbed. If the several constituent materials of the body, both fluid and solid, were to remain in the same unaltered state, both chemically and physically, there could be no interchange among them: in order that mutual penetration may take place between two elements, the one must differ from the other: that which is designed to absorb must be, with relation to that which is to be absorbed, more dense; that is, must contain a smaller quantity of water in proportion to its solid ingredients. For the continuance of the delicate processes concerned in the access and removal of the nutrient fluids, it is necessary that a difference should be established between the arterial and the venous blood in respect to density. This purpose Dr. W. conceives is accomplished by the abstraction from the former of a portion of its water by the sudoriparous glands of the skin on the one hand, and by the lymphatic vessels on the other.

That the separation of the lymph from the blood is calculated to increase its density, is proved by its chemical analysis; lymph containing from 96 to 97 per cent. of water, and blood from 77 to 82 per cent. Dr. W. regards this separation of lymph from the blood as the result of a purely vital process of the same